USSR/Geology

Card 1/1   Pub. 22 - 41/59

Authors   : Kudrin. L. N.

Title   : Absence of Paleogenic deposits in the south-western section of the Russian platform

Periodical   : Dok. AN SSSR 102/2, 347-349, May 11, 1955

Abstract   : The reasons for the absence of Paleogenic era deposits in the south-western sections of the Russian platform are explained. Six references: 2 USSR and 4 Polish (1909-1954). Table.

Institution : ....

Presented by : Academician N. M. Strakhov, January 2, 1955

VYALOV, O.S., professor; VENGLINSKIY, I.V., nauchnyy sotrudnik; GOLEV,
B.T., assistent; GORETSKIY, V.A., dotsent; GORBACH, L.P., aspirant;
KUDRIN, L.N., assistent; GEL'FAND, M.Kh., redaktor izdatel'stva;
MALYAVKO, I.V., tekhnicheskiy redaktor

[Geological museum of the Iv.Franko State University of Lvov; a
grief handbook] Geologicheskii musei L'vovskogo gosudarstvennogo
universiteta im. Iv.Franko; kratkii putevoditel'. [L'vov] 1956.
29 p.   (MLRA 9:8)

1. Lvov. Universytet.
        (Lvov University)   (Lvov--Geological museums)

KUDRIN, L.N.

Venus sobieskii Hilb. and Venus sobieskii Hilb.var.media Sok.from
Miocene deposits on the Southwestern amrgin of the Russian Platform.
Geol.sbor. [Lvov] no.2/3:188-193 '56.   (MLRA 10:3)
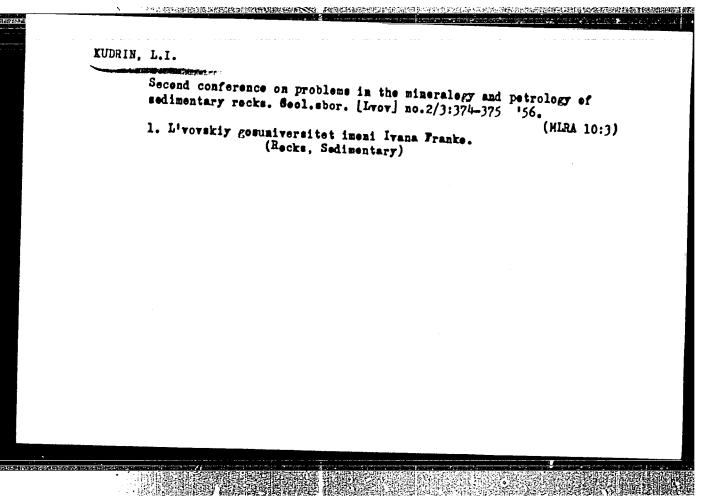
1. L'vovskiy gosuniversitet imeni Ivana Franko.
              (Russian Platform--Veneridae, Fossil)

KUDRIN, L.N.

"Podolsk stage of the Dniester Valley" by O.D.Serhieiev, by O.V. Komarova. Article reviewed by L.N. Kudrin).Geol.sbor.[Lvov] no.2/3:371-373 '56.

(MIRA 10:3)

1. L'vovskiy gosuniversitet imeni Ivana Franko.
    (Dniester Valley—Geology, Stratigraphic)
        (Serhieiev.O.D.) (Komarova, O.V.)

KUDRIN, L.I.

Second conference on problems in the mineralogy and petrology of sedimentary rocks. Geol.sbor. [Lvov] no.2/3:374-375 '56.

(MLRA 10:3)

1. L'vovskiy gosuniversitet imeni Ivana Franko.
(Rocks, Sedimentary)

KUDRIN, L.N.

Correlation of Miocene mineral deposits of the southwestern part of the Russian Platform to stratigraphic horizons and their facies.
Vop.min.osad.obr. 3/4:266-276 '56.   (MLRA 9:11)

1. Gosuniversitet imeni Ivana Franko, L'vov.
   (Russian Platform--Geology, Stratigraphic)
   (Russian Platform--Mineralogy)

LAZARENKO, Ye.K.; KUDRIN, L.N.

Occurrence of glauconite in the western region of the Ukraine.
Vop.min.osad.obr. 3/4:380-392 '56.   (MLRA 9:11)

1. Gosuniversitet imeni Ivana Franko, L'vov.
   (Ukraine--Glauconite)

15-57-3-3782

Translation from: Referativnyy zhurnal, Geologiya, 1957, Nr 3,
                    p 186 (USSR)

AUTHOR: Kudrin, L. N.

TITLE: Traces of Fossil "Permafrost" in the Environs of the
               City of L'vov (Ob iskopayemykh sledakh "vechnoy"
               merzloty v okrestnostyakh gor. L'vova)

PERIODICAL: Nauk. zap. L'vivs'k. un-ta, 1956, Nr 39, pp 141-145

ABSTRACT: The author considers the much-discussed question of
               whether the continental glacier, during the maximum
               advance of glaciation (Dnepr-Don), reached the region
               of L'vov. The author confirms the first observations
               of traces of fossil permafrost in the environs of
               L'vov and thus makes it possible to outline a belt
               of frozen tundra, bordering the Russian glaciation
               and occurring along the southwestern edge of the Rus-
               sian Platform in the vicinity of L'vov.

Card 1/1
                                                      A. M. Ch.

ALFER'YEV, G.P.; KUDRIN, L.N.

On the Tereshul' conglomerates and the Novoselitskoye horizon of
Transcarpathian tufas. Dokl. AN SSSR. 109 no.4:835 Ag 1956.

(MLRA 9:10)
1. L'vovskiy gosudarstvennyy universitet imeni Ivana Franko. Pred-
stavleno akademikom N.M. Strakhovym.

(Transcarpathia—Conglomerate)

KUDRIN, L.N.

Paleoecological studies of sediments in the lower horizon of the
lower Tortonian in the southwestern border of the Russian Platform.
Geol. sbor. LLvovJ no.4:277-294 '57.   (MIRA 13:2)

1.L'vovskiy gosuniversitet imeni Ivana Franko.
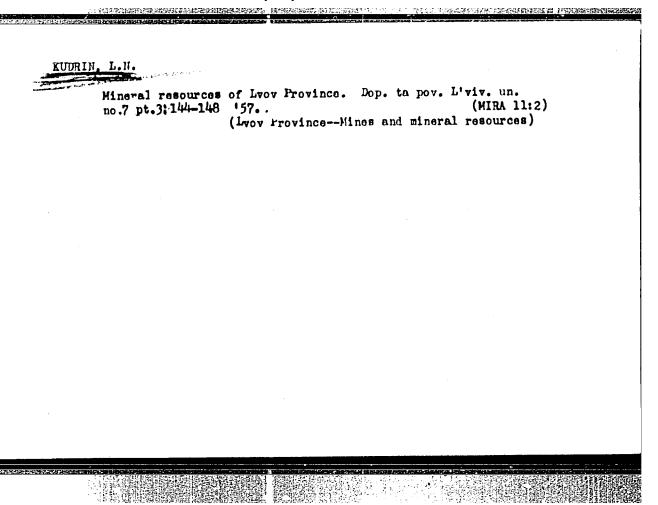   (Russian Platform--Paleoecology, Stratigraphic)
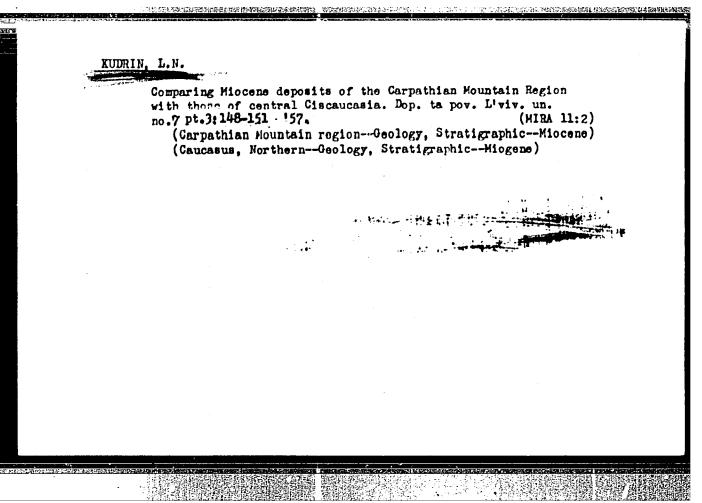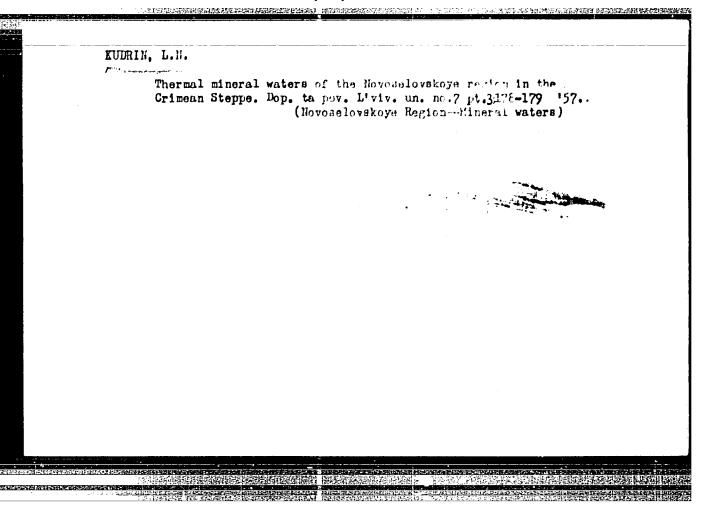
KUDRIN, L.N.

Finds of shark teeth in the Miocene of the southwestern border
of the Russian Platform. Geol. sbor. [Lvov] no.4:349 '57.
(MIRA 13:2)

1. L'vovskiy gosuniversitet im. Ivana Franko.
          (Russian Platform--Sharks, Fossil)

KUDRIN, L.N.

Mineral resources of Lvov Province. Dop. ta pov. L'viv. un.
no.7 pt.3:144-148 '57..   (MIRA 11:2)
                    (Lvov Province--Mines and mineral resources)

KUDRIN, L.N.

Comparing Miocene deposits of the Carpathian Mountain Region
with those of central Ciscaucasia. Dop. ta pov. L'viv. un.
no.7 pt.3:148-151 '57.   (MIRA 11:2)
   (Carpathian Mountain region--Geology, Stratigraphic--Miocene)
   (Caucasus, Northern--Geology, Stratigraphic--Miogene)

KUDRIN, L.N.

Thermal mineral waters of the Novoselovskoye region in the
Crimean Steppe. Dop. ta pov. L'viv. un. no.7 pt.3:178-179 '57..
(Novoselovskoye Region—Mineral waters)

KUDRIN, L.M. [Kudryn, L.M.]

Geology of the Rozdol sulfur deposit (western provinces of the
Ukrainian S.S.R.). Geol. zhur. 17 no.4:76-78 '57.   (MIRA 11:4)
(Ukraine--Sulfur mines and mining)

BOBROVNIK, D.P., prof., red.; VARTANOVA, N.S., dots., red.; KUDRIN, L.N.,
dots., red.; LAZARENKO, Ye.K., prof., red.; YASINSKAYA, A.A.,
dots., red.; GAZER, S.L., red. izd-va; MALYAVKO, A.V., tekhn.
red.

[Clays, study and utilization; conference papers] Issledovanie i
ispol'zovanie glin; materialy soveshchaniia. [L'vov] Izd-vo
L'vovskogo univ., 1958. 856 p. [Summaries in English, pp. 811-848].
(MIRA 11:9)

1. Soveshchaniye po issledovaniyu i ispol'zovaniyu glin. Lvov, 1957.
2. Chlen-korrespondent Akademii nauk USSR (for Lazarenko).
(Clay)

TKACHUK, L.G.; KUDRIN, L.N.; RIPUN, M.B.

Volcanic tuffs of the Neogene in western regions of the Ukrainian
S.S.R. Vop.min.osad.obr. 5:126-141 ' 58.   (MIRA 12:3)
          (Ukraine--Volcanic ash, tuff, etc.)

YASINSKAYA, A.A.; KUDRIN, L.N.

Mineralogical study of Maastrichtian deposits of the Lyuben'
Velikiy health resort. Vop.min.osad.obr. 5:267-269 '58.

(Lvov Province--Mineralogy)   (MIRA 12:3)

KUDRIN, L.N.

Tectonic characteristics of the southwestern margin of the Russian Platform. Geol. sbor. [Lvov] no.5/6:178-189 '58.

(MIRA 12:10)

1.Gosuniversitet imeni Ivana Franko, L'vov.
(Russian Platform--Geology, Structural)

KUDRIN, L.N. [Kudrin, L.M.]

Ervilian horizon of the lower Tortonian in the southwestern outskirts of the Russian Platform and the conditions of its formation [with summary in English]. Nauk.zap.Nauk.-pryrod. muz.AN URSR 6:114-125 '58.   (MIRA 12:1)
          (Ukraine--Geology, Stratigraphic)

KUDRIN, L.M.

Biostratigraphy and facies of the lower horizon of the lower
Tortonian in the southwestern part of the Russian Platform.
Pyt.geol. no.9:50-69 '58.   (MIRA 13:4)
    (Russian Platform—Geology, Stratigraphic)

KUDRIN, L.N.

Facies and formations in Miocene sediments in the Western
Ukraine. Uzb.geol.zhur. no.3:30-39 '59.   (MIRA 12:12)

1. L'vovskiy gosudarstvennyy universitet.
     (Ukraine, Western--Sediments(Geology))

3 (5)

AUTHOR: Kudrin, L. N.   SOV/20-126-2-36/64

TITLE: On the Tectonic Features of the North-eastern Part of the
              Upper Tisza Depression (Transcarpathia) (O tektonicheskikh
              osobennostyakh severo-vostochnoy chasti Verkhnetissenskoy
              vpadiny (Zakarpat'ye))

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 126, Nr 2,
              pp 355-358 (USSR)

ABSTRACT: The depression named in the title lies on the upper course
              of the said river, between Prešov (Preshov) (Czechoslovakia)
              and the Rumanian village of Borga (Borsha). It has a length
              of 300 km and a width of 50 km (Refs 2, 5). The author gives
              an exhaustive geological and tectonical description of the
              area based upon his own investigations (map 1:50000) he carried
              out together with G. P. Alfer'yev. Thereby a clear picture
              of a synclinal fold was drawn extending along the north and
              north-east edge of the depression named in the title. West
              and south-west of this synclinal fold there lie   like a
              side-scene 2 large synclines a.   T e r n o v s k a y a
              and b.   G a n i c h s k a y a .   Between them lies a small
Card 1/3   S t r e m e n u s s k a y a   a n t i c l i n e   (d i p).

On the Tectonic Features of the North-eastern Part   SOV/20-126-2-36/64
of the Upper Tisza Depression (Transcarpathia)

The author describes the profile of the River Teresva and the
fractures occurring in the said syn- and anticlines. All the
described fractures date from the end of the Pliocene period.
On the authority of V. B. Porfir'yev, the brittle coal-veins
found in the fractures developed through the melting of the
organic mass with the resulting further impregnation of these
fractures. At the end of the Pliocene and in the Pleistocene,
the northern, north-eastern, and north-western parts of the
Verkhne-Tissenskaya (Upper Tisza) depression raised. In the
south-west and western slope of the Vygorlat-Gutinskiy
volcanic range, however, depressions occurred. Here was a
quaternary sea-water (Ref 4). There are 9 references, 6 of
which are Soviet.

ASSOCIATION: L'vovskiy gosudarstvennyy universitet im. Ivana Franko
(L'vov State University imeni Ivan Franko)

Card 2/3

On the Tectonic Features of the North-eastern Part   SOV/20-126-2-36/64
of the Upper Tisza Depression (Transcarpathia)

PRESENTED: January 17, 1959, by N. M. Strakhov, Academician

SUBMITTED: January 16, 1959

Card 3/3

KUDRIN, L.N.

Recent data on Paleogene deposits in the southwestern outskirts of
the Russian Platform (Volyn'-Podolian Plateau). Dokl. AN SSSR 135
no.6:1469-1471 D '60.   (MIRA 13:12)

1. L'vovskiy gosudarstvennyy universitet im. I.Franko. Predstavleno
akademikom N.M. Strakhovym.
        (Volyn'-Podolian Upland--Geology, Stratigraphic)

KUDRIN, L.N.

Miocene terebratulids in the southwestern margin of the
Russian Platform. Paleont.sbor. [Lvov] no.1:51-59
'61.   (MIRA 15:9)

1. Gosudarstvennyy universitet imeni Ivana Franko, L'vov.
    (Russian Platform—Terebratulidae, Fossil)

KUDRIN, L.N.

Boundary of the Tortonian and Sarmatian in the Western Ukraine.
Geol.sbor. [Lvov] no.7/8:183-196 '61.   (MIRA 14:12)

1. Gosudarstvennyy universitet imeni Ivana Franko, L'vov.
        (Ukraine, Western—-Paleontology, Stratigraphic)

KUDRIN, L.N. [Kudrin, L.M.]

Discovery mammoth bones in the vicinity of Lvov. Nauk.
zap. Nauk. pryrod. muz. AN URSR 9:29-30 '61.   (MIRA 15:2)
(Lvov Region--Mammoth)

KUDRIN, L.N.; SIVKOVA, A.S.; MARTYNOVA, S.S.

Chemistry, composition, and minor elements of mollusk shells.
Min. sbor. no.15:362-367 '61.   (MIRA 15:6)

1. Gosudarstvennyy universitet imeni Ivana Franko, L'vov.
                (Shells)

KUDRIN, L.N. [Kudrin, L.M.]

Relation of the relief and recent tectonics with structural forms in the northeastern part of the Upper Tissa Depression, Transcarpathia. Geog. zbir. no.6:31-37 '62.   (MIRA 15:9)
(Transcarpathia—Geomorphology)

KUDRIN, L.N.; SIVKOVA, A.S.; MARTYNOVA, S.S.

Fluorine, phosphorus, and trace element concentration in bone
remains of fossil fishes and dolphins. Dokl. AN SSSR 142
no.4:930-932 F '62.   (MIRA 15:2)

1. L'vovskiy gosudarstvennyy universitet im. I.Franko.
Predstavleno akademikom N.M.Strakhovym.
                    (Geochemistry)
                    (Bones, Fossil)

KUDRIN, L.N.

Some new data on the Helvetian of the southwestern margin of Russian
Platform. Analele geol geogr 14 no.4:75-80 O-D '62.

KUDRIN, L.N.

Recent data on the Helvetian in the southwestern outskirts of the
Russian Platform. Dokl. AN SSSR 143 no.3:662-665 Mr '62.
(MIRA 15:3)

1. L'vovskiy posudarstvennyy universitet im. Iv.Franko.
Predstavleno akademikom N.M.Strakhovym.
            (Russian Platform—Geology,Stratigraphic)

BOYKO, V.O. [Boiko, V.O.]; KUDRIN, L.N. [Kudrin, L.M.]

Bryozoa from Upper Tortonian sediments in the upper part of the
Tisza trough (Transcarpathia) and palaeoecologic characteristics
of fauna complex. Visnyk L'viv.un. Ser.geol. no.1:70-76 '62.
(MIRA 16:7)

(Transcarpathia--Polyzoa, Fossil)

KUDRIN, L.N.

Small folding in the southwestern margin of the Russian Platform.
Geog.sbor. L'vov.otd.Geog.ob-va SSSR no.8:114-121 '64.

(MIRA 18:5)

KUDRIN, L.N.

Palaogane sediments in the southwestern margin of the Russian Platform and the fringe zone of the Carpathian piedmont fault. Izv. AN SSSR. Ser. geol. 29 no.12:72-80 D '64.   (MIRA 18:1)

1. L'vovskiy gosudaratvennyy universitet imeni I.Franko, L'vov.

VELIKOVSKAYA, E.M.; VEYMAN, A.B.; VESTNOV, G.F.; AHREN, Y.A.; LYUSTIKH,
    Ye.N.; LIPOVETSKIY, I.A.; KOLASHEV, A.N.; FILIPPOV, T.I.; SAVOCHKINA,
    Ye.N.; GLINDTER, V.Ye.; KOMAHSON, B.M.; IVANCHENKO, Ye.S.;
    LYUBIMOVA, L.V.; KIRSARA, A.Ya.; VISHKOVSKAYA, M.M.; KUDKIN, L.N.;
    CHERNIKOV, O.A.; SOROKIN, V.S.; IL'IN, A.N.; PITOVSKAYA, V.N.;
    ZEZIN, R.B.; TEPLITSKAYA, T.A.; BREZHNOVSKIY, S.A.; KISSIN, I.G.;
    CHIZHOVA, N.I.; PAVLOVA, O.P.; SIMIOV, Yu.I.

    Supplements. Biul. MOIP. Otd. geol. 39 no.4:150   91-2g '64.
                                                (MIRA 17:10)

KUDRIN, L.N.

Mineral composition, chemistry and trace elements of fossil and recent shells and skeletons of marine organisms. Biul. MOIP. Otd. geol. 39 no.5:141-142 S-O '64.

(MIRA 18:2)

KUDRIN, L.N.

Origin of largest karst caves in the U.S.S.R. and the methods of
their age determination. Biul. MOIP. Otd.geol. 39 no.5:153-154
S-O '64.

(MIRA 18:2)

KUDRIN, L.N.; MEL'NIKOV, V.S.; IORYSH, Z.I.; TYMCHISHIN, Ya.D.

Mineral composition and the structure of fossil and present-day shells and skeletons of marine organisms. Min.sbor. 18 no.2:231-235 '64.

(MIRA 18:5)

1. Gosudarstvennyy universitet imeni Ivana Franko, L'vov i Institut geologii i geokhimii goryuchikh iskopayemykh AN UkrSSR.

KUDRIN, L.N.; BURYNDINA, L.V.; KIRILLOVA, T.A.

New data on the age of layers from Candorbulina universa. Dokl.
AN SSSR 159 no.2:333-335 N '64.
(MIRA 17:12)

1. Predstavleno akademikom A.L. Yanshinym.

KUDRIN, L.N.; TATARINOV, K.A.

Miocene dolphins of the Western Ukraine. Paleont. hur. no.4:
68-74 '65.   (MIRA 19:1)

1. L'vovskiy universitet imeni Ivana Franko i L'vovskoye otde-
leniye Vsesoyuznogo paleontologicheskogo obshchestva. Submitted
March 10, 1964.

KUDRIN L P

SUBJECT	USSR / PHYSICS	CARD 1 / 2 PA - 1935
AUTHOR	KUDRIN,L.P., NIKOLSKIJ,B.A.	
TITLE	The Interaction between Fast Pions and Nuclei.	
PERIODICAL	Dokl.Akad.Nauk 111,fasc.4,795-798 (1956)	
	Issued: 1 / 1957	

In the course of this work the results obtained by computing the nonelastic scattering of negative 160 MeV-pions by the nuclei of the photoemulsion are compared with the experiment. On this occasion the assumption concerning individual meson-nucleon collisions within the nucleus is accepted as being correct, which is also indicated by the experimental data available concerning the nonelastic scattering of pions by nuclei.

Experimental data: The authors used the bundle of negative pions with the energy $E_\pi = 188 \pm 6$ MeV emerging from the chamber of the synchrocyclotron of the Institute for Nuclear Problems of the Academy of Science in the USSR. This bundle, after passing through a deflecting magnet and a collimator incided upon an emulsion chamber consisting of layers of 395 μ thickness. There are 30 of these layers. The stars found in the emulsion chamber were selected so that the experimental results obtained relate to $E_\pi = 160$ MeV. Together, a total of 1185 acts of interaction between such negative pions and the nuclei of the photoemulsion, among them 323 nonelastic acts of scattering of a charged pion, were found. The acts of scattering of pions were identified by the determination of grain density along the trace. For the 323 nonelastic acts of scattering the energy- and angular distribution of the scattered negative pions

were determined. For the further interpretation of the experimental material
obtained a graph shows the energy spectrum of the pions scattered in the angu-
lar range from θ = 90 to 180°; this spectrum has the average energy of
64 + 3 MeV and the half width (30,9 + 3) MeV.
Computation of the interaction between negative 160 MeV pions and the nuclei
of the photoemulsion was carried out on the assumption that meson-nucleon
collisions in the nucleus develop in a way similar to that of the free nucleons.
The results obtained on the basis of the scattering of pions by the nucleons
of the nucleus by the computation of the energy- and angular distributions of
meson-nucleon collisions within the nucleus do not depend on the particular
features of the cross section of the interaction between a pion and the nucleons
of the nucleus. Therefore the potential of interaction between the pion and the
nucleus can be evaluated with sufficient accuracy on the basis of the results
obtained by the aforementioned nonelastic scattering tests. The conditions
upon which such an evaluation is based are enumerated. For the average inter-
action potential of negative 160 MeV-pions the value $V = E_{exp} - E_{theor}$ =

= - (24 + 6) MeV was found. This value agrees with the average potentials of
the interaction between pions and nuclei which were obtained by experiments
concerning the elastic scattering of pions by nuclei.

INSTITUTION:

AUTHORS: Bat', G.A., Kudrin, L..   59-7-3/32

TITLE: On the Angular Distributions and the energy Distributions of
                Fission Neutrons (Uglovyye i energeticheskiye raspredeleniya
                neytronov deleniya)

PERIODICAL: Atomnaya Energiya, 1957, Vol. 3, Nr 7, pp. 15-22 (U...)

ABSTRACT: The present paper solves the problem of the angular distribu-
                tions of the fission neutrons on the basis of the statistical
                nuclear model by taking account of the anisotropy of the angu-
                lar distribution of the fission fragments. The rules governing
                the neutron emission from the fragments can be described by
                means of the thermodynamic (statistical) nuclear model. Here
                the following is assumed: The kinetic energy ε_0 of the inciding
                neutrons is wholly absorbed in the additional excitation of the
                fragments and not in the increase of kinetic energies. The
                energy of the excitation is distributed evenly over the frag-
                ments, independent of the ratio of their masses. For the temper-
                ature of the fragment corresponding to these conditions a formula
                is given. The angular distribution of the fragments is not iso-
                tropic and can be approximated by means of the expression
Card 1/2 $\chi(\alpha) = 1 + k \cos^2\alpha$, $k = k(\varepsilon_0)$. Here ε_0 denotes the energy of the

On the Angular Distributions and the Energy Distributions   89-7-3/32
of Fission Neutrons

inciding neutron and α the angle between the direction of motion
of the fragment. The coefficient k can be determined from a pre-
viously found experimental curve. For the energy spectrum of the
fission neutrons (for the remaining energies of the neutrons
causing the fission) a formula is derived. The energy spectra of
the fission neutrons are sensitive with respect to the inciding
neutrons but the difference from various ε_0 is slight. At low
excitations of the fragment the applicability of the statistical
model is doubtful. In conclusion a mathematical appendic is
given. There are 3 figures, 4 tables, and 10 references, 1 of
which is Slavic.

SUBMITTED: December 8, 1956

AVAILABLE: Library of Congress

1.   Fission neutrons - Distribution - Mathematical analysis
2.   Fission neutrons - Energy - Mathematical analysis
3.   Fission neutrons - Scattering - Mathematical analysis

Card 2/2

AUTHOR:	NIKOL'SKIJ,B.A., KUDRIN,L.P., ALI-ZADE,S.A. PA - 2058
TITLE:	Inelastic Scattering of 160 MeV x^--Mesons on Photographic Emulsion Nuclei. (Neuprugoe rassejanie 160 MeV x^--mezonov na jadrach fotoemulsii, Russian).
PERIODICAL:	Zhurnal Eksperimental'noi i Teoret.Fiziki, 1957, Vol 32, Nr 1, pp 48-58 (U.S.S.R.)
	Received: 3 / 1957 Reviewed: 4 / 1957

ABSTRACT: This work compares the computation of the inelastic scattering of negative pions of 160 MeV by the nuclei of photographic emulsion with the experiment. Computation of the interaction between fast pions and the nucleus, contrary to analogous computations of the interaction of fast nucleons, offers the advantage that in this case the nucleon part of the inner nuclear cascade has not to be taken into account.
<u>Experimental results:</u> The authors used a bundle of negative (188 + 5 MeV)-pions emitted by the chamber of the synchro-cyclotron of the IJAP AN SSSR (= Institute for Nuclear Problems of the Academy of Sciences of the USSR) and NIKFI emulsions of the type P. The experimental results obtained refer to a proton energy of E_x = 162 MeV of the pions. A total of 1185 cases of interaction between pions of this energy and

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PA - 2058

Inelastic Scattering of 160 MeV π^--Mesons on Photographic Emulsion Nuclei.

the nuclei of the photographic emulsion were obtained. In 323 cases one inelastically scattered pion was observed in this connection. Furthermore, the inelastically scattered pions which were emitted from the traceless stars and were found on the occasion of the bundle-like, 80 μ long pion traces, were investigated here. The curve obtained of the energy dependence of grain density received here is demonstrated in a diagram. A further diagram demonstrates the energy spectra of the pions scattered within the angular range ϑ = 90 - 180°. These spectra have the average energy E_{exp} = 64 $\pm$ 3 MeV and the half width ΔE_{exp} = 30,9 $\pm$ 3 MeV.

The computation of the inelastic scattering of negative pions of 60 MeV by the nuclei of the photographic emulsion is possible only under certain assumptions concerning some not exactly known properties of the interaction between pions and nucleons of the nucleus. The calculated energy- and angular spectra are demonstrated in diagrams and in a table. The sensitivity of the results found here to the above-mentioned

Card 2/3

PA - 2058

Inelastic Scattering of 160 MeV π⁻-Mesons on Photographic
Emulsion Nuclei.

assumptions are discussed in detail. Furthermore, the follow-
ing facts are investigated more accurately: The range of a
pion in the nucleus, the calculation of the scattering of
pions by the nucleons of a nucleus, the effects connected with
the modification of the potential on the occasion of the
passage of a pion through the boundary of a nucleus, the ab-
sorption of the pions in the nucleus.
The good agreement of the theoretical with the experimental
energy spectrum of the pions scattered by the nuclei of the
photographic emulsion proves that the here assumed model
describes the interaction between the pions and the nucleus
satisfactorily.

ASSOCIATION: Not given
PRESENTED BY:
SUBMITTED:
AVAILABLE: Library of Congress

Card 3/3

DROZDOV, S. I., ZARETSKIY, D. F., KUDRIN, L. P. and SEDELNIKOV, T. Kh.

"On the Formation of a Thermal Neutron Spectrum."

paper to be presented at 2nd UN Intl. Conf. on the praceful uses of Atomic
Energy, Geneva, 1 - 13 Sep 58.

KUDRIN, L.P.

Equation of state for partially ionized hydrogen. Zhur. eksp. i
teor. fiz. 40 no.4:1134-1139 Ap '61.   (MIRA 14:7)
(Equation of state) (Thermodynamics) (Plasma (Ionized gases))

l.1U.0
S/056/62/043/004/048/061
B104/B186

AUTHORS: Kudrin, L. P., Tarasov, Yu. A.

TITLE: The energy level shifts and the equation of state of a
             plasma

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43,
             no. 4(10), 1962, 1504-1516

TEXT: The first part deals with studies on the level shifts of bound
states of one-electron atoms in a plasma, using the four-dimensional
perturbation theory based on the equations derived by Salpeter-Bethe.
A system of Coulomb particles is investigated in the volume V under
thermodynamic equilibrium conditions at $T = 1/\beta$. The interaction energy
of a system comprising one ion with the charge z and one electron is
assumed to be sufficiently small to permit of using the perturbation
theory in order to investigate the Green two-particle function which
determines the levels of the discrete spectrum. For the level shifts of
the S-states of single-electron atoms in a plasma one obtains

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S/056/62/043/004/048/061
B104/B186

(25)

The energy level shifts and ...

$$\Delta E_{no} = \begin{cases} -\frac{5}{4}\left(\frac{z-1}{z}\right)^2 \frac{a_0 x}{2} & \text{для } n=1 \\ -\frac{3}{2}\left(\frac{z-1}{z}\right)^2 \frac{a_0 x}{3} n^3 & \text{для } n=2,3,4... \end{cases}$$

(25')

whereas
$$\Delta E_{20} = -6\left(\frac{z-1}{z}\right)^2 \frac{a_0 x}{3}, \qquad \Delta E_{21} = -\frac{11}{3}\left(\frac{z-1}{z}\right)^2 \frac{a_0 x}{3}.$$

holds for n = 2, 1 ≠ 0. Conclusions: If kT/E_n is small, the level shifts are proportional to the square root of the density, increasing with $\sqrt{n}$. The level shift also increases with increasing principal quantum number. The second part is a study on the equation of state of a Debye plasma. The statistical sum of a system consisting of particles which exhibit short-range forces is given by $Z = Sp \exp(-\beta(H - \mu N)) = \exp(-\beta\Omega)$, where μ is the chemical potential, Ω is the thermodynamic potential and N is the total number of particles involved in the system. Ω can be expressed in terms of Green's two-particle function in the form $\Omega = \Omega_0 + \Delta\Omega$. In the case of Boltzmann statistics, one obtains

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The energy level shifts and ...   S/056/62/043/004/048/061
                                                    3104/3186

$$\Delta\Omega = \frac{e^{2\mu\beta}}{(2\pi)^3}\left(\frac{m}{\pi\beta}\right)^{1/2}\int_0^1 \frac{dg'}{g'}\int dp \sum_k e^{-\beta E_k}\left(E_k - \frac{p^2}{m}\right)\psi_k(p)\psi_k^*(p). \qquad (40).$$

This equation is analogous to the known equation derived by Bethe and Uhlenbeck for the second virial coefficient when quanta are concerned.

$$\Delta\Omega = \frac{e^{2\mu\beta}}{16}\left(\frac{m}{\pi\beta}\right)^3\int_0^1 \frac{d\lambda}{\lambda}\int_0^\infty 4\pi r^2\lambda U(r)e^{-\beta\lambda U(r)}dr =$$

$$= -\frac{n^2}{23}\int_0^\infty (e^{-\beta U}-1)4\pi r^2 dr, \qquad n = e^{\beta\mu}(m/(2\pi\beta))^{1/2}. \qquad (41)$$

holds for the quasiclassical limiting case, whereas

$$\Delta\Omega = \frac{e^{2\mu\beta}}{(2\pi)^6}\left(\frac{m}{\pi\beta}\right)^{1/2}\int_0^e \frac{de^2}{e^2}\int dp\,dp'U(p-p')\sum_k e^{-\beta E_k}\psi_k(p')\psi_k(p). \qquad (42)$$

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The energy level shifts and ...

is obtained for a system involving particles with Coulomb interaction and

$$\beta \Delta \Omega = 2\pi n^2 (e^2 \beta)^3 \int_0^1 \lambda^2 \, d\lambda \int_0^\infty t \, dt \, (\exp (t^{-1} e^{-a t}) - 1),$$

(43)

for the quasiclassical limiting case, where $\psi_k(\vec{r})$ are wave functions for a Debye potential possessing the charges $e\sqrt{\lambda}$, $0 \leq \lambda \leq 1$, and $a = \beta e^2 \varkappa \lambda^{3/2} \ll 1$. In the case of ee, ii, ie, aa and ia interactions, these results are modified for a plasma which is characteristic for the existence of free electrons, ions possessing the charge $z(i)$ and atoms ionized by a factor of $(z-1)$. Starting from

$$\Delta \Omega = \frac{1}{(2\pi)^3 \beta} \int_0^{e^2} \frac{d e^2}{e^2} \int \varphi (p_1, g) \, \Gamma (p_1, p_1, g) \, dp_1 dg,$$

$$\Gamma (p, p', g) = (2\pi)^3 \beta U (p - p') + \frac{1}{(2\pi)^3 \beta} \int V (p - p_1) \varphi (p_1, g) \, \Gamma (p_1, p', g) dp_1$$

(50)-(51),

Card 4/5

The energy level shifts and ...

a thermodynamic perturbation theory is developed which yields

$$\Delta\Omega = \frac{1}{(2\pi)^6 \beta} \int_0^\infty \frac{de^2}{\pi} \int dp\, dp_1\, dg \exp\{\beta(\mu_e + \mu_i - \varepsilon_g)\} \times$$

$$\times \sum_{n,k} \Psi_n(p)\, \psi_k(p)\, (E_k' - \varepsilon_{p_1})\, \psi_n^*(p_1)\, \psi_k^*(p_1) \left\{ \frac{(E_k' - \varepsilon_p)\exp(-\beta E_k)}{(E_k' - \varepsilon_{p_1})^2} - \right.$$

$$\left. - \frac{(E_n' - \varepsilon_p)\exp(-\beta E_n)}{(E_n' - \varepsilon_{p_1})^2} \right\}. \qquad (56).$$

It is shown that the terms in thermodynamic functions due to level shifts are greater than the corrections for the Debye term, if the number of "atoms" equals that of the electrons. There are 2 figures.

SUBMITTED: May 7, 1962

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42705
S/020/62/147/002/011/021
B164/B102

AUTHORS: Kudrin, L. P., Sholin, G. V.

TITLE: The asymmetry of the hydrogen spectral lines in plasma

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 147, no. 2, 1962, 342-345

TEXT: The asymmetries of the contours of the H_β and H_δ lines observed
in hydrogen plasma when the density of the charged particles is
$N \gtrsim 10^{16} cm^{-3}$ are a function of density. They manifest themselves in the
intensity being shifted toward the short-wave region, in a shift of the
intensity maximum relatively to the line center, and in a variation of
the interval between the maxima. Hence the density of the charged
particles can be determined by comparing the contours found experimentally
with the values calculated from a theory which explains these asymmetries.
The author makes detailed calculations for the hydrogen atom allowing for
the electrostatic field of the neighboring ion. Besides the dipole term
which is obtained from the symmetric splitting of the lines by the linear

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The asymmetry of the hydrogen ...   S/020/62/147/002/011/021
B164/B102

Stark effect, the quadrupole contribution to the interaction energy between the atom and the ion is duly considered. The wave functions of the Schroedinger equation in parabolic coordinates are given for this case in first approximation. They lead to general expressions for the energy splitting, intensity and probability for the position of the Stark components. The numerical values for some transitions are given in a table. For the H_β line, the theoretical and experimental values obtained for the intensity variation in the maximum and for the shift of the maximum relative to the line center agree fairly well for $N = 10^{16} - 10^{18} cm^{-3}$. Whilst the calculated distances apart of the maxima as a function of N agree with experiments, it is unlikely that useful values could be obtained for the line width, owing to the rough assumptions that have to be made for the electric field of the ions, and since the line broadening due to electron impact is neglected. In order to improve the theory here presented, which includes no statement on the line center, the influence of the electrons should be considered. There are 2 tables.

PRESENTED: June 14, 1962, by M. A. Leontovich

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The asymmetry of the hydrogen ...   8/020/62/147/002/011/021
                                           B164/B102
SUBMITTED: June 5, 1962

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KUDRIN, L. P.

"Spectral Line Width of Atoms in Plasma,"

report presented at the 6th Intl. Conf. on Ionization Phenomena in Gases,
Paris, France, 8-13 Jul 63

L 9845-63   EWT(1)/EWG(k)/BDS/ES(w)-2--AFFTC/ASD/ESD-3/AFWL/SSD--Pz-4/
Po-4/Pi-4/Pab-4--IJP(c)
ACCESSION NK: AP3000577   S/0051/63/014/005/0607/0611

76

AUTHOR: Kudrin, L. P.; Sholin, G. V.

TITLE: Shift of He II spectrum lines in dense plasma

SOURCE: Optika i spektroskopiya, v. 14, no. 5, 1963, 607-611

TOPIC TAGS: plasma, plasma densities, spectral lines, He II, H

ABSTRACT: Usually plasma densities are determined from the width of selected spectral lines. A new method for measuring plasma densities was proposed by the authors (Doklady AN SSSR, 147, 352, 1962). This method is based on the noticeable asymmetry of some hydrogen lines in dense plasma, connected with inhomogeneity of the electric field acting on the atoms. The asymmetry is due to quadrupole interaction of the plasma electrons with the emitting atoms. The same thing is true of He II and other one-electron bound states in plasma. Another possible way of determining plasma density is provided by the shift of spectrum lines. Blue shift of the 46866 Angstrom line of He II was discovered by Berg, Ali, Linke, and Greim (Phys. Rev., 125, 199, 1962). This shift can be explained with the aid

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ACCESSION NR: AP3000577

of the electron impact theory proposed by Baranger (Phys. Rev., 111, 481, 1958).
The authors' calculations, based on the assumption that the location of the line
peak is determined mainly by the central Stark component and employing some of
Baranger's equations, lead to line shift values as a function of the plasma
density in good agreement with the experimental results of Berg et al, thereby
substantiating Baranger's impact theory. Nevertheless, the authors feel that
determination of plasma densities from the asymmetry of hydrogen lines should be
more reliable. Orig. art. has: 8 equations and 2 tables.

ASSOCIATION: none

SUBMITTED: 17Jul62   DATE ACQ: 12Jun63   ENCL: 00

SUB CODE: PH   NR REF SOV: 002   OTHER: 005

Ja/mh

Card   2/2

ACC NR   AP4047171

AUTHORS: Kudrin, L. P.; Tarasov, Yu. A.

TITLE: On the width of spectral lines of atoms and ions in a plasma

SOURCE: Optika i spektroskopiya, v. , no. 4, 1964, 489-498

TOPIC TAGS: spectrum line, line broadening, plasma ion, plasma

ABSTRACT: The Green's function method is used to calculate the
spectral lines with allowance for
with an aim at a possible
neutral line contours
density or temperature
the possibility of
distribution must be
Coulomb forces. The calculation in conjunction

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ACCESSION NR: AP4047171

... Feynman diagrams ...
... of the ...
... the distance ...
... are obtained ...
... term is determined ...
... The authors thank ...
orig. art. has: 43 formulas.

ASSOCIATION: None

SUBMITTED: 26Oct63   ENCL: 00

SUB CODE: OP, ME   NR REF SOV: 004   OTHER: 004

Card 2/2

L 14970-66   EWT(1)/EEC(f)/EEP(h)-2/EEC(m)   IJP(c)   AT

ACC NR: AP6001804   SOURCE CODE: UR/0089/65/019/006/0553/0559

AUTHOR: Kudrin, L. P.

ORG: none

TITLE: International Symposium on the Properties and Application of Low-Temperature Plasma

SOURCE: Atomnaya energiya, v. 19, no. 6, 1965, 553-559

TOPIC TAGS: plasma physics, plasma source, plasma temperature, low temperature plasma, scientific conference, international conference, applied chemistry

ABSTRACT: The International Symposium on the Properties and Application of Low-Temperature Plasma was held in Moscow in July, 1965 as a section of the XX International Congress on Theoretical and Applied Chemistry. The symposium was attended by scientists from Belgium, Bulgaria, Great Britain, German Democratic Republic, India, Poland, Soviet Union, USA, France, Federal German Republic, Japan, and some other countries. More than 70 papers were read at two plenary sessions and sessions of four specialized sections: 1) elementary processes in low-temperature plasma; 2) plasma properties; 3) methods for the generation of plasmas and methods for the study of low-temperature plasma; and 4) low-temperature plasma in chemistry and chemical technology. The article presents brief summaries of 48 of the most interesting papers. The proceedings of the symposium will be published as a separate book.

SUB CODE: 20 / SUBM DATE: none

Card 1/1

L 14977-66   EWT(1)/ETC(f)/EPF(n)-2/EWG(m)   IJP(c)   AT
ACC NR: AP6001806   SOURCE CODE: UR/0089/65/019/006/0559/0561

AUTHOR: Kudrin, L. P.

ORG: none

TITLE: Second All-Union Conference on Low-Temperature Plasma Generators

SOURCE: Atomnaya energiya, v. 19, no. 6, 1965, 559-561

TOPIC TAGS: low temperature plasma, plasma source, plasma physics, plasma diagnostics, scientific conference

ABSTRACT: A conference devoted to physical and technological aspects of low-temperature plasma was held in Novosibirsk in June, 1965. It was attended by representatives from Moscow, Leningrad, Minsk, Novosibirsk, Alma-ata, Kiev, and other cities of the Soviet Union. A total of 115 papers was presented at three sections dealing with 1) electrical arc generators of low-temperature plasma and their characteristics; 2) the production and the properties of plasma and methods of investigation; and 3) the applications of low-temperature plasma generators. The conference surveyed the accomplishments of the relatively "classical" and modern achievements in the field, and noted the successes of the engineering calculations based on the similarity theory. Participants stressed the need for further studies of the thermodynamic and kinetic properties of low-temperature plasma, for the development of standard methods for plasma diagnostics, for studies of the chemical

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L. 14977-66

ACC NR: AP6001805

plasma diagnostics, and for the establishment of methods for the diagnostics of non-equilibrated plasmas. Particular attention was given to the development of heavy duty power sources for large plasmatrons, interactions and stability of arcs, use of UHF discharge plasmas in chemical processes, and heat exchanges between low-temperature plasma and materials. The article presents short summaries of 23 papers. The proceedings of the conference will be published in the journal "Teplofizika vysokikh temperatur" of AN SSSR.

SUB CODE: 05, 20 / SUBM DATE: none

Card 2/2

KUDRIN, L.V.

Experimental basis for the maximum permissible omega-chlorocarboxylic acid concentration in reservoir water. San. okhr. vod. ot zagr. prom. stoch. vod. no.6:98-117 '64.   (MIRA 18:3)

1. Kafedra kommunal'noy gigiyery I Moskovskogo ordena Lenina meditsinskogo instituta imeni I.M.Sechenova.

KUDRIN, M.I.

Using ferrous metal shavings as a substitute for scrap metal.
Lit.proizv. no.7:9-12 O '54.   (MLRA 7:12)
    (Scrap metal)

KUDRIN, M.T.

Diagnosis and treatment of wounds of the pericardium and heart.
Zdrav.Belor. 5 no.8:12-13 Ag '59.   (MIRA 12:10)

1. Zaveduyushchiy khirurgicheskim otdeleniyem Baranovichskoy
tsentral'noy gorodskoy bol'nitsy.
          (PERICARDIUM--WOUNDS AND INJURIES)
          (HEART--WOUNDS AND INJURIES)

KUDRIN, M.T.

Rupture of a dissecting aortic aneurysm. Zdrav. Bel. 7 no.12:
26-28 D '61.
(MIRA 15:2)

1. Zaveduyushchiy khirurgicheskim otdeleniyem TSentral'noy gorodskoy
bol'nitsy g. Baranovichi.
(AORTIC ANEURYSMS)

KUDRIN, N.

Standardized ship furniture. Rech. transp. 20 no.8:45 Ag '61.
(MIRA 14:10)

1. Predsedatel' Soveta pervichnoy organizatsii Nauchno-tekhniche-
skogo obshchestva vodnogo transporta.
(Ships--Equipment and supplies)

... metal at melting temperature, T_{ns} and T_n - melting temperature and mold surface temperature, δ - elongation %, ...

KUDRIN, N.A., inzh.; BIDULYA, P.N., doktor tekhn. nauk

Thermal interaction of castings with metal molds. Lit. proizv.
no.12:25-29 D '65.   (MIRA 18:12)

Ardin N, N.I.

SUBJECT: USSR/Reclamation   99-...

AUTHOR: Kudrin, N.I., Engineer

TITLE: "About Utilization of Shoal Water Zones of Reservoirs for
          Agricultural purposes". (O sel'skokhozyastvennom ispol'-
          zovanii melkovodnykh zon vodokhranilishch)

PERIODICAL: "Gidrotekhnika i Melioratsiya", 1957, # 7, pp 37-38, (USSR)

ABSTRACT: Construction of water reservoirs result in flooding of large
           areas of valuable land. Along the shores of these reser-
           voirs are zones of shallow water (less than 2 m), which have
           little water storing capacities. S.Y. Zhuk estimated that
           50,000 hectares of arable land could be reclaimed by diking
           the shoal water zones at the Kuybyshev and Stalingrad water
           reservoirs (Pravda, Jan 27, 1956).

           Besides the use of the reclaimed acreage, the following ad-
           vantages would result: reduced loss from evaporation, improved
           health conditions for the populations living nearby (elimina-
           tion of breeding grounds for mosquitoes). The required capi-
Card 1/2   tal investment will be same as for melioration measures. In

TITLE: "About Utilization of Shoal Water Zones of Reservoirs for
           Agricultural purposes". (O sel'skokhozyastvennom ispol'
           zovanii melkovodnykh zon vodokhranilishch)

           instances where the building of dams is not feasible, the
           shoals ought to be used for growing of wild rice or grass for
           fodder. In the interest of national economy, reclamation of
           shoal water zones should be included in the economic planning
           of the country.

           The article contains 2 photographs, and 1 reference (Slavic)

ASSOCIATION:

PRESENTED BY:

SUBMITTED:

AVAILABLE: At the Library of Congress.

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KUDRIN, N. N.

Bezmaslianye sterzhnevye krepiteli. Moskva, Mashgiz, 1950. 69, 3 p. diagrs.

Bibliography: p. 71.

Oilless core binders.   DLC: TS236.K8

SO: Manufacturing and Mechanical Engineering in the Soviet Union, Library of Congress, 1953.

KUDRIN, O.I.

p 7 r 9   PHASE I BOOK EXPLOITATION   SOV/3848
                                                    SOV/11-M-97

Moscow. Aviatsionnyy institut imeni Sergo Ordzhonikidze

Prisoyedineniye dopolnitel'noy massy v struynykh apparatakh;
    sbornik statey (Mass-Flow Augmentation in Jet Engines:
    Collection of Articles) Moscow, Oborongiz, 1958. 238 p.
    (Series: Its: Trudy, vyp. 97) Errata slip inserted.
    2,210 copies printed.

Ed. (Title page): A.V. Kvasnikov, Professor; Ed. (Inside
    book): S.G. Boshenyatov (Deceased); Managing Ed.:
    A.S. Zaymovskaya, Engineer; Ed. of Publishing House:
    T.A. Valedinskaya; Tech. Ed.: L.A. Lebedeva.

PURPOSE: This collection of articles is intended for scientific
    workers at engineering schools and research institutes and also
    for engineers working in experimental design offices.

COVERAGE: This collection contains abridged dissertations from
    the Department of Aviation Engine Theory, Faculty No. 2, of
    the Moskovskiy aviatsionnyy institut (Moscow Aviation Institute)

Card 1/12

Mass-Flow Augmentation in Jet Engines (Cont.)   SOV/3848

during the period from 1946 to 1953. The articles consider various problems arising in augmenting the mass flow in jets and in utilizing the additional mass flow for increasing the thrust of jet engines. References accompany each article. No personalities are mentioned.

TABLE OF CONTENTS:

This paper is a theoretical study of the mixing process in an ejector used for mass-flow augmentation in a jet engine. The theory considers the initial phase of the mixing process for the case where the basic flow is subsonic. Fundamental equations are derived which char- acterize the mixing process in the entrance section of

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Mass-Flow Augmentation in Jet Engines (Cont.)   SOV/3848

Kudrin, O.I., Candidate of Technical Sciences.   Pulsating Jet
Nozzle with Mass-Flow Augmentation

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Mass-Flow Augmentation in Jet Engines (Cont.)   SOV/3848

This paper presents a theoretical and experimental study of the effects of adding atmospheric air to pulsating jets. It is shown that the addition of atmospheric air to a pulsating gas jet may lead to a considerable increase in its impulse. The addition of supplementary air mass is not only due to ejection, that is, the parallel addition of air into the driving jet which is associated with mixing, but also to the interaction of separate masses of air added gradually. Two forms of this gradual addition are possible, namely gradual expulsion of additional mass and gradual inflow of air behind the driving jet. The largest increment in thrust (up to 120 percent of the thrust of a single nozzle) was obtained in a compound jet nozzle with an open shroud which includes the three basic forms of the process of mass addition (ejection, expulsion, and gradual inflow of air behind the driving jet). The gradual inflow is the basic process which produces a large increment in thrust and determines the character of its variation as a function of the basic parameters of the pulsating flow. The thrust increases obtained in the process with gradual inflow were found to be close to the corresponding calculated values based on the assumption of no losses due to friction or vortex formation. This

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. Mass-Flow Augmentation in Jet Engines (Cont.)   SOV/3848

result confirms that the process of gradual inflow involves
small energy losses and has efficiencies of 75 percent and
more. The tests also showed that the thrust increases are
reduced as the cyclic frequency and the initial rate of pres-
sure drop are increased. For a given frequency the thrust
increment increases as the outflow from the central nozzle
becomes more unsteady. The experiments also showed that
the addition of atmospheric air to the exhaust of a piston
engine may increase the exhaust thrust up to 70 percent.

Ovsyannikov, B.V., Candidate of Technical Sciences, and O.I. Kudrin,
Candidate of Technical Sciences. Exhaust Jet Nozzle of a Piston
Engine with Addition of Atmospheric Air   181
   1. Test setup   182
   2. Test results   183
   3. Fields of application   188
   4. Conclusions   189
This brief paper reports the results of tests to determine
the thrust increase of the exhaust of a piston engine
due to the addition of atmospheric air. It was found
that an open ejector shroud at the exhaust exit increased
thrust between 50 and 70 percent. The authors consider that

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Mass-Flow Augmentation in Jet Engines (Cont.)   SOV/3848

the use of ejectors on piston engines exhaust pipes is
very practical where use can be made of secondary masses
of air already entrained by the airplane (such as cooling
air for the engine or radiation, etc.) or having small
velocity with respect to the mixing chamber.

Shapiro, Ya.G., Candidate of Technical Sciences. Experimental
Investigation of a Liquid Ejector

Card 10/12

SOV/147-58-3-10/18

AUTHOR: Kudrin, O.I.

TITLE: On the Selection of the Relative Magnitude of the
             Critical Section of the Nozzle for a Liquid Fuel
             Combustion Chamber of a Rocket (O vybore otnositel'noy
             velichiny kriticheskogo secheniya sopla kamery ZhRD)

PERIODICAL: Izvestiya Vysshikh Uchebnykh Zavedeniy, Aviatsionnaya
             Tekhnika, 1958, Nr 3, pp 78-88 (USSR)

ABSTRACT: A geometrical factor appreciably affecting the
             characteristics of combustion chambers appears to be
             the relative magnitude of the critical (throat) section
             of the nozzle in relation to the cross section of the
             chamber i.e. F_{KP}/F_K, where F_{KP} – area of the throat of
             the nozzle, F_K – cross section of the combustion chamber.
             An increase of the ratio above a certain value leads to
             substantial drop in pressure along the axis of the
             chamber (Ref.1) and this results in the following:
             1) supply of heat to the gas takes place with decreasing
             thermal efficiency; 2) residence time (the time interval
             during which the molecules remain in the combustion
             chamber) decreases and in consequence the time available
Card 1/8   for the fuel to burn is shorter; 3) the rate of burning

SOV/147-58-3-10/18

On the Selection of the Relative Magnitude of the Critical Section of the Nozzle for a Liquid Fuel Combustion Chamber of a Rocket

may be changed by the drop in pressure and increase in gas velocity. This paper gives the results of theoretical investigations of the effect the relative critical section of the nozzle has on the performance of liquid propellant rocket engines (LPRE), taking into account only two factors: thermal efficiency and residence time. Assume that it is possible to obtain in a rocket engine consisting of a cylindrical combustion chamber of a volume U_p = const. and a nozzle with sufficiently small throat section ($F_{KP}/F_K < 1/4$) (Fig.1b) a working process which is characterized by the total heat generation φ_K and the corresponding to it specific impulse $P_{\gamma A}$. Suppose now that we wish to obtain a similar process in a chamber of a greater relative critical section ($1/4 < F_{KP}/F_K < 1$), Fig.1a, i.e. with substantially changed pressure in the chamber. These questions arise: 1) how must the volume of the combustion change if it is necessary to preserve the residence time; 2) how does the heat generation and the specific thrust change if the

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On the Selection of the Relative Magnitude of the Critical Section
of the Nozzle for a Liquid Fuel Combustion Chamber of a Rocket

volume of the chamber cannot be changed. In the
solution of these problems it was assumed that neither
the time nor the form of the combustion process in the
chamber depend on the ratio F_{KP}/F_K. Also it was taken
that the fuel mixture is an ideal gas of temperature
$T_{01} = 300°K$ when entering the combustion chamber.
If the velocity of the burning is w and the cross section
of the chamber is F then the volume of the chamber swept
by the front of the gases during the interval of time
$d\tau$ is $dU = f.w.d\tau$ (Fig.2). The total volume of the
combustion chamber for a given residence time is given
by Eq.1. In the case of a constant pressure process we
get also Eq.2, where p_1 - initial pressure of the gases;
P, Υ, T and T_0 - local values of pressure, specific
weight, temperature and stagnation temperature of the
gases; G_{cek} - rate of flow of gases through the nozzle
per second. In the case of non-constant pressure process,
the relation $\gamma = \gamma(\approx)$ is more complicated, but it may be
determined from simultaneous consideration of the heat

Card 3/8   generation and the variation of the gas parameters in
the chamber as functions of time. Eq.6 gives the

On the Selection of the Relative Magnitude of the Critical Section
of the Nozzle for a Liquid Fuel Combustion Chamber of a Rocket

required volume for the constant pressure process ($U_p = c$)
and Eq.7 for the non-constant pressure process ($U_p \neq c$).
To be able to integrate the appropriate integrals, it is
necessary to know the "law" of the heat generation during
the combustion as well as the time of combustion process.
There is no rigorous presentation of the dependance on
time, till now, to the complicated process of combustion
which takes place in a LPRE. However, there are some
particular cases where this dependence is known; for
example: (a) the case where there is no mixing of the
products of reaction with a fresh charge; in this case
the process of combustion follows the "law"

$$\varphi = 1 - e^{-m\tau} \qquad (9)$$

(b) the case where the process in the whole volume of
the combustion chamber has the same concentration. In
this case the relation is

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$$\varphi_1 = \frac{1}{1 + \frac{m_1}{\tau}} \qquad (10)$$

On the Selection of the Relative Magnitude of the Critical Section
of the Nozzle for a Liquid Fuel Combustion Chamber of a Rocket

These may be considered as the bounds within which the
actual processes in the combustion chamber of a LPRE
take place. Since in this paper the main interest is
focused on the performance of an engine with non-constant
pressure combustion process in relation to that of
constant pressure process, the relation of Eq.9 will be
taken. Substituting the expression for φ in Eq.6 and
integrating it when C_p = const., we obtain the
expressions for the volume required to secure a given
residence time (τ) in the combustion chamber, namely
Eq.11 for the case of isobaric combustion and Eq.12 for
the case of non-isobaric combustion, (the latter having
two forms depending whether

$$\lambda_1^2 \gtrless (2A - 1) - \sqrt{(2A-1)^2 - 1} \quad)$$

and Eq.13 for the case with

$$\frac{F_{kp}}{F_k} = 1.$$

With the help
of these equations it is possible to evaluate the effect
of the relative magnitude of the throat section of the

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nozzle on the required volume of the combustion chamber
and hence on the specific impulse of the rocket.
Assuming that the time and the mode of combustion is the
same in both cases (isobaric and non-isobaric) a
coefficient

$$K_u = \frac{U_{p \neq c}}{U_{p=c}} = f\left(\frac{F_{kp}}{F_k}\right)$$

is introduced, it
simply being a comparative factor between the constant
pressure chamber and an actual chamber where the constant
process is not achieved. Fig.5 shows this relation and it
is seen that the required volume of the non-constant
pressure chamber increases directly with F_{kp}/F_k (e.g.
for $F_{kp}/F_k = 1$ the increase is 40%) but depends very
little on the temperature. In practice it does not
always pay to increase the volume of the combustion
chamber as this results in increased weight of the
engine and also in increased heat losses through the
larger area where the temperature is the highest.
Card 6/8   Especially in aircraft application this may be impossible.

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For this reason the author examines next in Chapter 111
how the specific impulse varies with non-constancy of
pressure in the combustion chamber. The results are
presented in Fig.6 which shows the relation

$$\frac{\Delta P_{yd}}{P_{yd}} = \frac{P_{yd} - P'_{yd}}{P_{yd}} = f(\frac{F_{kp}}{F_k}) \quad \text{for various } \varphi_k$$

where: P_{yd}, P'_{yd} are the specific impulses with constant
pressure chamber and non-constant pressure chamber
respectively and φ_k is the completeness of the
combustion process. The figure shows that the larger
the ratio F_{kp}/F_k the larger the loss in specific impulse

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and the less complete combustion process. There are 6 figures and 3 references of which 2 are Soviet and 1 English.

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KUDRIN, S.A.

Average chemical composition of main soil types in the European
part of the U.S.S.R. according to bulk analyses. Pochvovedenie
no.5:21-26 My '63.

(Soils—Composition)   (MIRA 16:5)

The application of potash fertilizers to the soils of the Golodnaya Steppe. A. A. Kuperm. *dobrenie i Urozhai 3, 1039-41(1931).* — Expts. on cotton and alfalfa in the Golodnaya Steppe region of Turkestan have shown that K fertilization speeds up the maturity of cotton as demonstrated by the earlier opening of the bolls. No marked yield increase was noted by the application of K alone. Only in combination with P and N did the K fertilizers have an effect. Similar results were obtained with alfalfa. Of the 3 forms of K tested (chloride, sulfate and K salts), the K salts were least effective.

J. S. Joffe